

What is claimed as new and desired to be protected by Letters  
Patent of the United States is:

1. A semiconductor device which integrates a  
5 plurality of semiconductor chips into a single package,  
comprising:

a first semiconductor chip which includes a plurality  
of first bonding pads outputting first signals having a first  
level; and

10 a second semiconductor chip which includes a plurality  
of second bonding pads electrically coupled to a part of the  
plurality of first bonding pads to receive the first signals  
having the first level from the first semiconductor chip  
through the part of the plurality of first bonding pads and a  
15 plurality of third bonding pads which converts the first  
signals received through the plurality of second bonding pad  
into second signals having a second level different from the  
first level and outputs the second signals through the  
plurality of third bonding pads.

20

2. The semiconductor device as defined in Claim 1,  
wherein the second level is greater than the first  
level.

25 3. A signal processing system, comprising:  
a first apparatus comprising a semiconductor device

which integrates a plurality of semiconductor chips into a single package and comprises:

5           a first semiconductor chip which includes a plurality of first bonding pads outputting first signals having a first level; and

10           a second semiconductor chip which includes a plurality of second bonding pads electrically coupled to a part of the plurality of first bonding pads to receive the first signals having the first level from the first semiconductor chip through the part of the plurality of first bonding pads and a plurality of third bonding pads which converts the first signals received through the plurality of second bonding pad into second signals having a second level different from the first level and outputs the second signals through the plurality of third bonding pads, and  
15           an exchangeable second apparatus configured to be connected to the first apparatus and to receive the second signals having the second level outputted from the first  
20           apparatus through the plurality of third bonding pads.

4.       The signal processing system as defined in Claim 3,  
          wherein the second level is greater than the first  
25   level.

5. A method of manufacturing a semiconductor device for processing different level signals, comprising the steps of:

providing on a substrate a first semiconductor chip  
5 which includes a plurality of first bonding pads outputting first signals having a first level;

providing on the substrate a second semiconductor chip which includes a plurality of second bonding pads electrically coupled to a part of the plurality of first  
10 bonding pads to receive the first signals having the first level from the first semiconductor chip through the part of the plurality of first bonding pads and a plurality of third bonding pads which convert the first signals received through the plurality of second bonding pad into second signals  
15 having a second level different from the first level and output the second signals through the plurality of third bonding pads.

6. The method of manufacturing the semiconductor  
20 device for processing different level signals as defined in Claim 5, wherein the second level is greater than the first level.

7. A reader/writer having a first and a second  
25 semiconductor chip mounted on the same substrate for communicating at least with an exchangeable electronic

product, said substrate having a number of lead pins, said reader/writer comprising:

5 of first bonding pads and at least one second bonding pad, each coupled to internal circuitry of the first chip, to output electrical signals at a lower voltage at the first pad, and to receive input signals at a higher voltage at said at least one second pad;

10 third bonding pads and fourth bonding pads coupled to internal circuitry of the second chip, to receive electrical signals at the lower voltage at the third pads and to receive or output electrical signals at the higher voltage at the fourth pads;

15 a number of said first pads being coupled to respective third bonding pads to deliver thereto signals at the lower voltage, at least said one second pad being coupled to at least one fourth pad to receive therefrom signals at the higher voltage, and a number of said fourth pads being coupled to selected ones of said lead pins to deliver thereto or receive therefrom  
20 signals at said higher voltage;

said second chip containing circuits coupled to third pads and to fourth pads to provide signals at the higher voltage to selected fourth pads in response to signals at the lower voltage received at selected third  
25 pads, and to provide signals at said higher voltage to said at least one second pad in response to signals

input at said higher voltage at least at one of said fourth pads;

selected ones of said lead pins being configured for electrical contact with said exchangeable electronic product to deliver signals thereto at said higher voltage or receive signals therefrom at said higher voltage;

whereby except for responding to signals at the higher voltage received at said at least one second pad, the first chip operates at the lower voltage but lead pins coupled to fourth pads and selectively coupled with said exchangeable electronic product receive therefrom or deliver thereto signals at the higher voltage.

8. A reader/writer as in claim 7 in which the exchangeable electronic product is a smart card operating at a nominal voltage of 5 Volts and said first chip operates nominally at 3.3 volts except for responding to inputs at said at least one second pad.

9. A method of operating a reader/writer with a smart card, comprising:

outputting electrical signals at a lower voltage at first bonding pads of a first semiconductor chip and receiving input signals at a higher voltage at said at

one second bonding pad of said first chip;

receiving signals at the lower voltage at third bonding pads of a second semiconductor chip, mounted on the same substrate as the first chip, and receiving and  
5 outputting signals at the higher voltage at fourth bonding pads of the second chip;

supplying signals at the lower voltage from first pads to third pads, and in response outputting signals at the higher voltage from fourth pads, and supplying  
10 signals at the higher voltage from at least one fourth pad to said at least one second pad;

selectively coupling a smart card to fourth pins to thereby supply signals to the smart card at the higher voltage and receive signals at the higher  
15 voltage from the smart card;

whereby except for responding to signals at the higher voltage received at said at least one second pad, the first chip operates at the lower voltage but lead pins coupled to fourth pads and selectively coupled with the smart card  
20 receive therefrom or deliver thereto signals at the higher voltage.